New marker identified for early diagnosis of lung cancer

17 September 2013

A protein called isocitrate dehydrogenase (IDH1) is present at high levels in lung cancers and can be detected in the blood, making it a noninvasive diagnostic marker for lung cancers, according to a study published in *Clinical Cancer Research*, a journal of the American Association for Cancer Research.

"This study is the first to report identification of IDH1 as a novel biomarker for the diagnosis of non-small cell lung cancers (NSCLC) using a large number of clinical samples," said Jie He, M.D., Ph.D., director of the Laboratory of Thoracic Surgery at the Peking Union Medical College and Chinese Academy of Medical Sciences in Beijing. "Lung cancer has a high mortality rate, mostly because of late diagnosis. With an increase in aging population, we are likely to see an increase in lung cancer incidence and a need for better biomarkers for early diagnosis. We have identified IDH1 as an effective plasma biomarker with high sensitivity and specificity in the diagnosis of NSCLC, especially lung adenocarcinoma."

Lung cancer is the leading cause of cancer deaths in both men and women in the United States and worldwide. To detect lung cancer in blood, currently certain biomarkers including CEA, Cyfra21-1 and CA125 are used, but these markers are not very sensitive, according to He.

He and colleagues found that IDH1 could be detected in the blood of lung cancer patients with 76 percent sensitivity and 77 percent specificity. When they used a mathematical model to combine the detection of IDH1 with the detection of existing markers CEA, Cyfra21-1, and CA125, the sensitivity increased to 86 percent.

"Based on the present data, IDH1 can be used to detect stage 1 lung cancer; however, it is also possible that IDH1 could be used to detect precancer but further studies are required to address that possibility," said He.

He and colleagues used blood samples collected from 943 patients with NSCLC and 479 healthy controls, enrolled between 2007 and 2011 in the Cancer Institute and Hospital of the Chinese Academy of Medical Sciences. None of the study participants had a cancer diagnosis, nor were they treated for cancer in the three years prior to the study. Using methods called ELISA and ECL, they measured the levels of IDH1, CEA, Cyfra21-1, and CA125 in the participants' blood.

The researchers then divided the samples into a training set and a test set to validate the detection efficiency of IDH1. They found the data obtained from the test set were as good as those from the training set, demonstrating the robustness of IDH1 as a biomarker for lung cancer diagnosis.

The median IDH1 levels in patients with two types of lung cancer, adenocarcinoma and squamous cell carcinoma, were 2.7-fold and 2.2-fold higher, respectively, compared with healthy controls.

The researchers also found that combining the detection of all four markers—IDH1, CEA, Cyfra21-1, and CA125—helped to better classify different types of adenocarcinoma, compared with detection with IDH1 alone.

He and colleagues are planning to conduct a multicenter clinical trial for further validation of IDH1.

"Our research also suggests IDH1 may be involved in the development of lung cancer, and it may be a good target for the treatment of NSCLC," said He. His team is currently studying the molecular mechanisms that increase IDH1 in lung cancer patients and its clinical implications.

Provided by American Association for Cancer Research